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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/652,580	08/31/2000	Vishnu K. Agarwal	98-0616.15	4283

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EXAMINER

EVERHART, CARIDAD

ART UNIT PAPER NUMBER

2825

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/652,580	Applicant(s) AGARWAL, VISHNU K.	
	Examiner Caridad M. Everhart	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on RCE filed 2-24-2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 54,56,76,78-83 and 85-99 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 54,56,76-82 and 93-99 is/are allowed.
- 6) ☒ Claim(s) 83,85,86,89,91 and 92 is/are rejected.
- 7) ☒ Claim(s) 87,88 and 90 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1-26-04</u> . | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 83, 85, and 86 are rejected under 35 U.S.C. 102(e) as being anticipated by Hintermaier, et al. ("Hintermaier")(US 6,100,187).

Hintermaier discloses the steps of forming a conductive layer 30(col. 7, lines 1-2 and Fig. 3) and treating the layer with PH3 and the layer may be W(col. 4, lines 33-41). Then a dielectric layer is deposited (col. 7, lines 30-35). The second conductive layer formed after the treatment of the first conductive layer is interpreted to be the portion of the first conductive layer which is reacted to form layer 30a shown in Fig. 3. The layer 30b is the remaining unreacted portion of the first conductive layer. This is done to prevent the oxidation of the first conductive layer(col. 1, lines 60-67). With respect to the amendment to claim 86, In Fig. 5, Hintermaier discloses a conductive layer 26 on the dielectric layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 89,91, and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hintermaier as applied to claim 83 above.

Hintermaier is silent with respect to a third conductive layer and the conditions of the treatment with the phosphine gas.

With respect to the third conductive layer, it is believed that the disclosure made by Hintermaier implies that there may be a third conductive layer (col. 3, lines 48-54 and col. 4, lines 55-61). In the disclosure of applying the transition metal to a conductive contact and in the disclosure that only a portion of the upper layer of the transition metal layer may react, this implies that there may be a third conductive layer because the conductor in the contact would be one layer, and the transition metal would be a second layer, and the reacted metal would be a third layer. It would have been obvious to one of ordinary skill in the art at the time of the invention that the process taught by Hintermaier could be applied to a conductor comprising a third metal layer because the disclosure made by Hintermaier implies that the conductor may comprise multiple layers.

With respect to the conditions of the treatment, the flow rates and temperature are variables of the art which one of ordinary skill in the art may determine in order to obtain the result of the reaction of the phosphine with the metal. With respect to the carrier gas, it is conventional in the art to use an inert carrier gas in the flowing of a reactive gas in a reaction process.

The IDS filed 1-26-04 has been reviewed.

Chen et al. Discloses the use of tantalum pentoxide in a capacitor.

Zenke discloses phosphine in the formation of the silicon layer of a capacitor.

Sekine et al discloses treating the lower conductor of a capacitor with a metal halide and then with silane.

Allowable Subject Matter

Claims 54,56,76-82,93-99 are allowed.

Claims 87,88, and 90 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not teach tantalum pentoxide, nor tungsten nitride as the material which is treated with the recited compounds, nor copper.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2825

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
CARIDAD EVERHART
PRIMARY EXAMINER

C. Everhart
4-20-2004